

SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION



\$5 a year 15c a copy

Oct. 27, 1928



PERIODICAL ROOM
GENERAL LIBRARY
UNIV. OF MICH.



A WIZARD HONORED

Congressional Medal Awarded to Edison

(See page 253)

Vol. XIV

No. 394

Fire Preserves Indian Ruins

Archaeology

A tragic fire which laid waste to a western Indian village more than 2,000 years ago is now proving an aid to modern science. The flames left the charred ruins in a state particularly favorable to preservation through the centuries. A Smithsonian scientist who excavated the abandoned village this summer has found there important evidence of a missing link in America's prehistory.

The village is in a remote district of southwest Colorado on the Piedro River. Dr. Frank H. H. Roberts, Jr., Smithsonian archaeologist, has found there in the ruins a variety of skulls, many bone and stone implements, and 250 pieces of pottery. These finds are now being studied by scientists at the Smithsonian Institution, and Dr. Roberts believes that they may be pronounced acceptable evidence of the hitherto missing link in the development of the prehistoric Pueblo people.

The oldest known inhabitants of

the Southwest were the Basket-Maker Indians who did not learn to make pottery until the closing days of their era. These were followed by the cliff-dwelling Pueblos, whose unique domestic habits and signs of high intelligence have made them a subject of intensive scientific research.

"One of the major questions confronting the archaeologist and anthropologist in America today," said Dr. Roberts, "concerns what happened to those Basket-Maker Indians who immediately preceded the Pueblos. Did the Basket-Makers mix peacefully with the Pueblo tribes and lose their identity in the course of generations? Or were they wiped out by warfare?"

"While I cannot answer the question definitely now, my finds of this summer seem to throw important light on it, indicating that the first alternative is correct, and that the Basket-Makers did not perish suddenly as a race."

The architecture of the newly excavated village is of a transition type, between the old style Basket-Maker houses, and the later Pueblo ideas. All but three of the skulls are Pueblo in type, round-headed, with artificial flattening of the head caused by binding the babies' skulls to the cradles. The other three are long-headed and not flattened, representing the older race and the older idea of baby handling. The bone needles and tools were comparatively primitive, representing the old culture, but the pottery showed progress into the art ideals of the Pueblos.

The fire trapped some of the inhabitants of the village, and their charred skeletons were found still lying in the ruins of their homes. Jars filled with corn, beans and dried fruit, lying about the homes, indicated that the harvest had just been gathered when the catastrophe occurred.

Science News-Letter, October 27, 1928

Sunburned Automobiles

Chemistry

Automobiles, like bathers, may become sunburned, and manufacturers are now taking steps to prevent it. And just as human sunburn can be prevented by covering the skin with a layer of some substance that prevents the ultra-violet rays from reaching the skin, a thin layer of color a thousandth of an inch thick prevents it in the automobile, according to M. J. Callahan, expert on lacquers.

Most automobile manufacturers now finish their cars with the same type of brushing lacquer that is so popular for home decoration. These consist largely of cellulose nitrate, formed by a chemical reaction between nitric acid and cotton. Unfortunately, some of the constituents of the lacquer are damaged by the ultra-violet rays in sunshine. So a very thin layer of colored lacquer is used as the outer coat and the color molecules stop the rays and save the lacquer. More than a million automobiles a year are now protected in this way.

Science News-Letter, October 27, 1928

There are nine states which have less than half a million people apiece.

In ancient times honey was the chief sweetening for food and sweetmeats.

In This Issue—

A wizard honored, p. 253—Big bags of gas, p. 255—Rubberized fiddles, p. 255—Words, p. 256—Hot bees, p. 257—Hard and Sharp, p. 259—Alaska's golden age, p. 259—No more wisents, p. 261—Hush-a-bye-baby, p. 261—80 basements down, p. 261—Nature, p. 262—High shots, p. 263—No rays from cells, p. 263—For your library, p. 265—Science vs. slavery, p. 266.



SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science. *Medical Progress* is merged into the SCIENCE NEWS-LETTER.

Edited by Watson Davis.

Publication Office, 1918 Harford Ave., Baltimore, Md. Editorial and Executive Office, 21st and B Sts., N. W., Washington, D. C. Address all communications to Washington, D. C. Cable address: Sciencserv, Washington.

Entered as second class matter October 1, 1926, at the postoffice at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

Subscription rate—\$5.00 a year postpaid. 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Special reduced subscription rates are available to members of the American Association for the Advancement of Science.

Advertising rates furnished on application.

Copyright, 1928, by Science Service, Inc. Reproduction of any portion of the SCIENCE NEWS-LETTER is strictly prohibited since it is distributed for personal, school, club or library use only. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service, details and samples of which will be gladly sent on request.

INTERPRETING week by week, the latest developments in the various fields of science, this magazine attempts also to present its articles in the most pleasing and readable typography and the most convenient arrangement.

The *clippability*, *indexing*, and *automatic dating* of each article are unique features.

This is a *separable magazine*. Each original article can be clipped or torn out without losing or damaging another important article on the other side. These original articles are backed by reprinted quotations or excerpts, short one-sentence items, advertisements, and other material not likely to be clipped and preserved.

Each article is automatically *indexed* by the key word printed in italics just below the heading, or at the end of the article when the article has no heading. Articles can thus be filed easily into any system of classification, whether it be Library of Congress, Dewey, or one of the reader's own devising.

Each article is automatically *dated* by its last line.

All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

American Government Honors Edison

Invention



REVERSE OF THE EDISON MEDAL, conferred on Thomas A. Edison by the action of Congress. The obverse, showing the profile of Edison, is depicted on our cover. The medal is the work of John R. Sinnock, of Philadelphia, and was struck at the Philadelphia Mint

Among her sons of achievement America boasts only one "wizard" of invention. She has had a host of inventors, but still only one "wizard."

To capture the human voice upon a cylinder of wax; to produce pictures in which the people move as they do in actual life; to imprison a hair-like thread within a vacuum and make it glow electrically with such brilliance as to furnish the people with a wonderfully useful lamp—these things are magical indeed. And these things all shout the same magical name. It is the name of Edison.

As the "wizard of Menlo Park" began the golden jubilee year of his incandescent electric light, America paid him homage of a singular sort. Acting as the representative of all his fellow-Americans, the Secretary of the Treasury, Andrew W. Mellon, presented him last Saturday night, October 20, with a special Congressional gold medal, of which the obverse forms our cover design this week. The ceremony was broadcast by radio; and the President of the United States spoke to the nation from Washington, to remind the millions who listened of the influence Edison has been in their daily living.

At the same time Edison renewed his acquaintance with an old friend, for there was returned to him the original phonograph, with which, in 1877, he reproduced his own recitation of "Mary had a little lamb." For many years this has reposed in the Science Museum at South Ken-

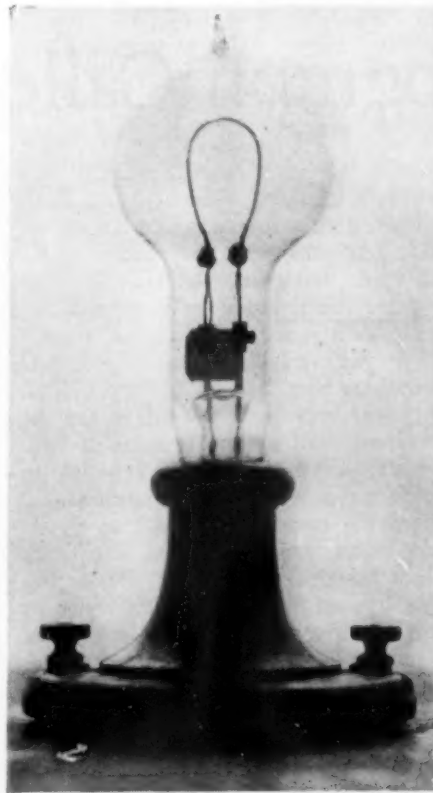
sington, London, but Donald Campbell, of the British Embassy, gave it back to him.

The ceremony, however, was in commemoration of the electric lamp, because the incandescent lamp is generally appreciated as Edison's biggest contribution to the national welfare and the national wealth. He himself once described it as "the most satisfactory of my inventions to contemplate."

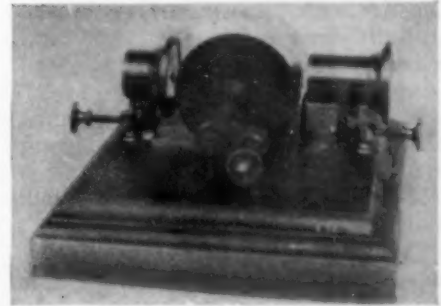
The incandescent lamp, however, was born amid storm and stress, amid the thunderings of critics and the vociferations of skeptics. In the world at large, especially the scientific world, there was heard the turbulent clash of carping voices whenever Edison and his electric illumination scheme were touched upon.

Yet, in the sylvan solitude of Menlo Park, New Jersey, fifty years ago, there was merely intensive industry. The days slipped by untroubled and unheeding—busy, indeed, but calm.

The bright autumn sun poured in through those tall, unshaded laboratory windows. Men came and went,



EDISON'S ORIGINAL ELECTRIC LIGHT looked like this. The actual lamp was destroyed in order to examine the filament. The 49th anniversary of its success was marked by the presentation to Edison of the Congressional medal



THE ORIGINAL EDISON PHONOGRAPH, which has now been returned to Edison by the British Government, after reposing for many years in the Science Museum at South Kensington, London

absorbed in curious tasks. At one of the work tables sat Charles Batchellor, the model-maker, whose delicate fingers patiently struggled to mount a slender bit of carbonized cotton thread upon a little stem of glass. Beside him, watching, assisting, directing, sat Edison.

As the October day drew to a close, the setting sun threw crimson rays across the long bare floor, and the rows of bottles lining the shelves, the tables with their crowded paraphernalia, the tall Sprengle mercury pump, the fat, sprawling coal stove gleamed in the weird red light. The silent figures bending over the table became silhouettes of fiery outline, and their shadows loomed gigantic upon the opposite wall. The scene suggested the lair of some alchemist of old, a place of wonder-doings, a den of magic—as it were.

That evening the work went on. It continued until past midnight, as it often did. The next morning the new experimental lamp—the thin filament encased in its bulb of glass—was taken over to the Sprengle pump and carefully attached to the exhaust mechanism, to have the air pumped out.

Edison watched all that day as the pump worked on. At last he connected the lamp to his large bichromate battery and every now and then he sent an electric current through the bulb. Instantly the gases buried in the filament began pouring out. The pump worked on for hours longer; and Edison stayed at his post, "doctoring" the lamp with frequent doses of electricity, until the highest possible vacuum existed inside that little bulb—one-millionth of an atmosphere.

It was eight o'clock in the evening of October 21, (Turn to next page)

Edison Honored Anew—Continued

1879. Edison, satisfied with his work thus far, spoke tersely to young Francis Jehl, the pump-tender. He sent for Ludwig Boehm, his glass-blower, who carefully sealed off the lamp and helped Jehl mount it on the test-stand to undergo its life-test.

A few minutes later the spot of yellow incandescence began to glow; and then the little group took up what Jehl always afterward called the "death watch."

"We had tested many lamps before that day," Jehl recalls. "And none had come up to the mark that Edison sought. With this new lamp we did not know the result would prove any better. The life-test alone as in all previous cases, would decide the question of success or failure. The one thing we wanted to know was how long the lamp would last—how long a life it was good for—how soon it would show signs of burning out. So we began the death-watch—the death-watch of an incandescent lamp which, unknown to any of us, was symbolic of the deathless lamp of the future."

That watch lasted forty hours. For forty hours the lamp glowed steadily—all the rest of that night, all the next day and night, and until about one o'clock in the afternoon of the second

day. Never once in that interval was it left without observers.

Edison himself sat there as unmoved as a Stoic—a lean, well-knit, youthful figure, without coat, collar or tie, and wearing the black skull cap which he frequently exhibited in those days. Once only he relaxed, stretching full-length upon a nearby laboratory table for two or three hours' sleep, while his faithful henchmen kept the vigil—Jehl, Batchellor, Francis R. Upton, his mathematician, occasionally Ludwig Boehm and Martin Force, and even sturdy John Kreusi, his machinist, the first man besides Edison ever to hear the human voice by phonograph.

When the "wizard" awoke, the lamp still glowed. He and Upton measured its electrical resistance—one of the basic characteristics that made possible Edison's triumph where others had failed.

Then the watch went on—Edison in silent contemplation, dreaming a bit, as he realized the goal was at hand, of "great central stations in many cities, supplying electric current for large numbers of incandescent lamps." That was his broad economic conception, his "complete system of lighting," which he even then had clearly

planned in every detail.

At last the glowing filament burned out. But they knew success was theirs. Edison exclaimed to his assistants, in quiet, equanimous elation: "That's fine, boys, fine! If the lamp will burn forty hours now, I know I can make it last a hundred." Before many months had passed he had made it last a thousand.

The first thing he did, however, was to deliberately break that glass bulb and carefully remove the filament for a microscopic examination. It was his invariable practice; nothing that could possibly add to his knowledge of incandescent lighting was ever left undone.

That is why the original forty-hour lamp no longer exists. It cannot be enshrined in any museum, not even in Henry Ford's growing aggregation of Edisonian treasures. The nearest approach to it is the replica designed by lamp engineers of the General Electric Company from the authoritative recollections of Edison's men and of Edison himself.

Science News-Letter, October 27, 1928

Typhoid fever is most prevalent in this country in late summer and autumn.

First Phonograph Called A Fake

By EDWIN E. SLOSSON

The first Edison phonograph exhibited in Paris was denounced as fake when it was exhibited before the French Academy of Sciences March 11, 1878, by the physicist, Count du Moncel. As the learned assembly heard from the pasteboard horn the words which had been spoken into the mouthpiece by Edison's representative, Puskas, "The phonograph is highly honored by being presented to the Academy of Sciences," one of the academicians, Monsieur Bouillaud, sprang up and shouted in a voice choking with righteous wrath at the imposition, "You rascal! Do you think you can fool us with a trick of ventriloquism?"

Perhaps the American accent of the phonograph salesman may have given some excuse for this incredulity, but even after Count du Moncel had taken his turn at the machine, and this had repeated in his own pure accents: "We thank Mr. Edison for having sent us his phonograph," the skeptical scientist was not convinced. Only on September 30, after he had

Invention

himself given the apparatus a thorough testing, was M. Bouillaud convinced that this was not a case of ventriloquism. But he added, "No one could have believed that a scrap of mere metal could have reproduced the noble tones of the human voice."

The phonograph is one of the few inventions that has no history behind it. Most inventions nowadays are the culmination of a long process of previous experimentation and research to which many persons have contributed. Often the courts take years to determine who has furnished the final factor essential to success. There has been lots of litigation about most of Edison's inventions, but when he sent in his application to the Patent Office, December 24, 1877, the examiners reported "no references" to anything of the sort having been made previously, and the patent was issued with unusual promptness February 19, 1878. There is no written record that any man in the history of the world ever had heard his own voice reproduced mechanically prior to the page in Edison's notebook, dated July 18, 1877, on

which he sketched the future phonograph and noted in his neat upright hand, "Just tried experiment with diaphragm having an embossing point and held against paraffine paper moving rapidly. The speaking vibrations are indented nicely and there's no doubt that I shall be able to store up and reproduce automatically at any future time the human voice perfectly." This confident claim has been completely verified in our own times.

Science News-Letter, October 27, 1928

Christmas Cards OF WOOD

Thin, silvery slices of wood, beautiful in tint and texture and daintily decorated, to convey your Christmas greetings.

Send \$1.00 for sample set of five and illustrated circular.

ROMEYN B. HOUGH CO.
LOWVILLE, N. Y.

New Airships to Dwarf Graf Zeppelin

Aviation

While the Graf Zeppelin, world's largest airship, dwarfs her sister, the U. S. S. Los Angeles, American designers and enthusiasts are looking forward to 1931, when the all-American ZRS-4, an airship nearly twice the capacity of the Graf Zeppelin, will take the air. A little less than a year later the ZRS-5, a sister ship from the same mould will be produced here in America by the Goodyear Zeppelin Corporation as the result of a contract signed by the U. S. Navy just a few days before the Graf Zeppelin left Germany.

Even earlier, the Graf Zeppelin's world airship title will be challenged, for in England two airships, both 5,000,000 cubic feet in capacity, are nearing completion. They are John Bull's bid for supremacy in the air lanes as well as on the sea's surface. America may expect visits from the R-100 and R-101 in the spring although they may be flight-tested on the air routes to Egypt, India and Australia for which they were designed.

Not discounting the achievements of the Graf Zeppelin's flight, airship experts note that the new German airship is an enlarged edition of the ZR-3, now the Los Angeles, which four years ago made the same trans-Atlantic crossing from Friedrichshafen to Lakehurst on its way to join the U. S. Navy. The Graf Zeppelin is 771 feet long instead of 658 feet. The diameter of the Graf Zeppelin is only ten feet greater than that of the Los Angeles. Both have five engines and their external appearances are similar. The principal difference in the interior is accommodation for the gas fuel ballonets at the bottom of the large envelope and an extra corridor or "cat walk" running the length of the ship.

The new Navy airships when completed will be only fourteen feet longer than the Graf Zeppelin but they will be 132.9 feet in diameter and hold 6,500,000 cubic feet compared with the Graf Zeppelin's 3,708,000 cubic feet. The American ships will incorporate some new de-

sign factors that promise to make them unique.

Due to the use of inert helium instead of explosive hydrogen for inflation, it will be possible to place the eight engines inside the hull. Engine specifications have not been announced but it is considered probable that gasoline will be abandoned for heavy oil fuel. The internal engines will allow the ship to slip through the air with less resistance and there will be less danger of the engines being torn off in a severe storm. A complete airplane hangar will be housed within the hull from which five airplanes can be launched from a trapeze, like performers at a circus.

The frame work of the new airship will have a strength unequalled in any other design. Made of duralumin, the favorite airship metal, because of its lightness, every portion of the frame will be close to corridors and passageways and accessible for inspection and repair even during flight.

Science News-Letter, October 27, 1928

Stone Age Jawbones on Islanders

Anthropology

Massive jawbones, resembling in many details of structure the jaw of the ancient Heidelberg Man, have been found by Prof. A. N. Burkitt of Sydney University in a collection of modern human remains from the South Sea island of New Caledonia. He reports his researches in the British scientific journal, *Nature*.

The discovery of the Australian anthropologist suggests the possibility of a revolutionary change in our assumptions concerning the kind of a person *Homo Heidelbergensis* was. It has always been taken for granted that he was a pronounced lowbrow. Though no skull of his race has been discovered, and a single jawbone is the only Heidelberg relic ever turned up, this jawbone is of such brutish proportions that the assumption has always been that the rest of his head must have been shaped to match it, and that in particular he had a low and sloping forehead and a brain notably smaller than that of modern man.

The jawbones examined by Prof. Burkitt are more advanced in structure than the Heidelberg jaw in some respects, notably in having more of a chin, but they are decidedly "Heidel-

bergian" in their general depth and massiveness and especially in the width and configuration of the ramus, or angle where the jaw fits into the cheek. But the natives of New Caledonia are not lowbrows; even though they are savages their skulls are "modern," and their brains are just about as large as those of contemporary Europeans.

This leaves us with the possibility, disquieting to current anthropological assumptions, that the massive-jawed Heidelberg man did not necessarily have a gorilline cranium. And nothing short of the discovery of a Heidelberg skull can really settle the matter.

Science News-Letter, October 27, 1928

Rubberized Violins

Physics

Modern violins may be made to rival the product of the old masters by impregnating the wood with rubber latex before varnishing, according to the claim of a German investigator named Ditmar-Graz, writing in the scientific magazine *Natur und Kultur*. He states that this treatment causes the wood to remain permanently elastic.

Science News-Letter, October 27, 1928

Carriers For Colds

Medicine

When colds "run in the family" it is no sign that the family is constitutionally subject to colds. It may be that some member of the family is acting as a carrier, just as some people are typhoid carriers, suggests Dr. P. Watson-Williams in a report to the *Practitioner* (London) of observations made on ninety consecutive patients. Sometimes one child is known for starting colds among his brothers and sisters. This same child may become immune to colds himself but still harbor cold germs and be able to pass them on to others. If he grows up and has a family, he may still be starting colds in the family, although they are no longer traced to him.

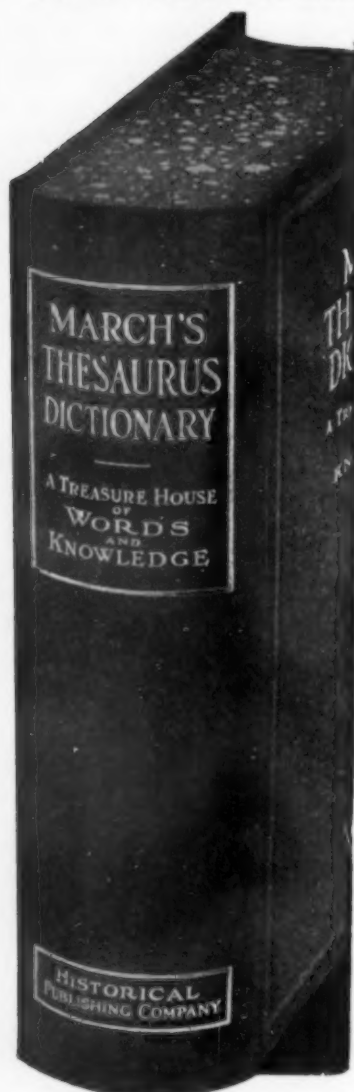
The reason for this may be an unsuspected infection of his nasal sinuses, the honey-comb structures back of the nose and eyes. This same infection may be the reason for some children growing a second set of adenoids, when the first ones have been removed with the tonsils, Dr. Watson-Williams thinks.

Dr. Watson-Williams also reports a tendency for families that are prone to colds to have infections, in the abdomen, for instance in appendix and gall bladder.

Science News-Letter, October 27, 1928

**"--a real Treasure Chest of 'English undefiled.'
We commend it unreservedly."**

*Review of
Reviews*



1462 pages, each 7¼" x 10¼", yet only 2¼" thick because of special thin opaque paper. Bound in Buckram with Gold Stamped Title.

**HISTORICAL
PUBLISHING CO.,**
Dept. SC-10,
1334 Cherry St.,
Philadelphia, Pa.

Please send me (postpaid in U. S. and Canada) a copy of the new Amplified Edition of March's Thesaurus Dictionary. I will pay the postman \$3.00 plus 12c. C.O.D. fee, and if I keep the book will pay you \$2.00 per month for three months. Canada, duty extra; Foreign, \$10.00 cash with order. If for any reason I do not wish to keep it I will return it in good condition within 10 days and you are to refund my \$3.12.

Name _____

Address _____

The RIGHT Word is always at your command

in speaking, in writing—if you have this "Treasure House of Words and Knowledge."

You no longer need halt and stumble, groping blindly for the words to accurately express your thoughts.

The full riches of the English language, the illimitable wealth of words from which the ablest writers and most eloquent speakers draw, can be yours always, through

MARCH'S THESAURUS DICTIONARY

The only book in the English language which **defines** the words you know and **finds** and **defines** the words you do not know, or have forgotten.

It is not a study course. You do not have to spend months of preparation before you realize on its value.

It begins to be helpful the minute you receive it and soon becomes so useful that you will agree with one enthusiastic purchaser who says, "I would not take \$1000 for my copy if I did not know where I could get another."

By its unique patented arrangement of grouping related words, it makes instantly available for you the exact word for any desired shade of meaning or different words to express the same thought without repetition.

For instance, should you desire a word expressing the thought of **love**, you find under the word-grouping **LOVE-HATE** all of the words in the English language expressing the thought of **love** and in adjoining columns all the words expressing **hate**. All of these words are listed alphabetically in column form, instantly found, classified under the part of speech to which they belong and each accurately defined so that you can choose the right word for your purpose and know that you are using it correctly.

In addition, the new Amplified Edition,

recently off press, is full of facts that you need every day. It contains chapters which are complete text books on English grammar, composition, correct use of English, rules of punctuation, references to the vital facts of the Bible, historical and geographical facts, Americana, etc., and a complete section devoted to the only known list of

The Important Words of the Leading Arts and Sciences

prepared by Science Service, Inc., with the aid of specialists in the respective sciences. These words are defined and grouped by the March's Thesaurus method which makes available at once the word you cannot recall. A single reference in this section places before you not only the word sought but all of the related words in that science as well.

To the scientist or the man interested in scientific subjects, the value of this section is beyond computation.

March's Thesaurus Dictionary is invaluable to you in business because it gives you vital facts and develops a more unerring, forceful vocabulary. It is needed in your home because it develops—in children and parents alike—the habits of accuracy of speech and of association of words and facts, habits essential to a successful career.

Inspect This New Amplified Edition At Our Risk

Despite the fact that March's Thesaurus Dictionary contains information which you cannot find in any unabridged dictionary or in the most costly encyclopedia, it is sold for only \$9.00, net. And even at this low price we offer you the opportunity of examining it before you purchase.

Send in the coupon now. Keep the book for 10 days—use it constantly in answering the thousand and one questions which arise daily. Then if you do not find it so valuable that you would not part with it, simply return it and we will refund your deposit without question.

"Anyone who has use for a dictionary has an equal need for March's Thesaurus."

—Dr. Edwin E. Slosson.

"Cannot be too highly praised."—*Forum*.

"Valued by those who wish to use their mother tongue with accuracy and effectiveness."—*N. Y. Times*.

"It not only defines known words but also supplies just the right words you need for each shade of meaning."

—*World's Work*.

How Bees Keep Warm in Winter

Entomology

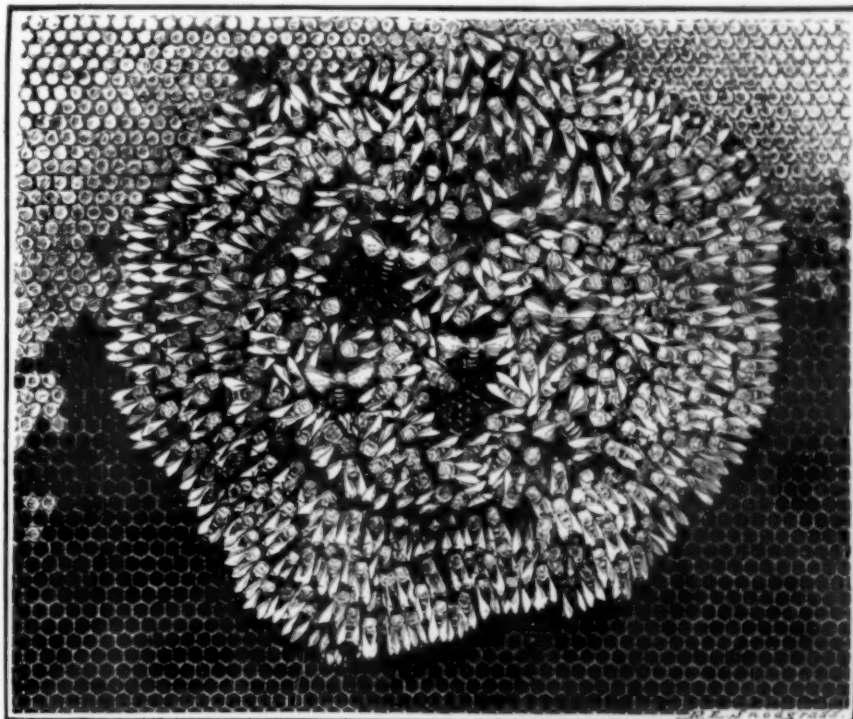
By MARJORIE MACDILL

When the last of the asters and goldenrod are gone and the thrifty ant is all set to hand out unfeeling sarcasms to her shiftless neighbor, the erstwhile giddy grasshopper, then the honey bee knows that her sunshiny peregrinations from flower to flower must give way to more restricted but none the less strenuous activities within the darkened hive of winter.

Before modern industry developed the great sugar plantations of the tropics, the only readily available source of concentrated sugar was honey. Since a perennial sweet tooth seems to have been an integral part of human nature ever since man was a man, his intimate association with the honey bee antedates his knowledge and interest in any other insect. For thousands of years he ran a neck and neck race with the bears in locating and looting bee trees until sometime, probably in the New Stone Age, he turned apiarist by inducing the honey makers to live near his dwelling in sections of hollow logs, empty baskets and earthen vessels. Bees have been kept by savage tribes throughout the ages wherever the climate has been such that the industrious insects could endure. Bees figure in inscriptions on Egyptian monuments dating back to the fortieth century before the Christian era, while there is documentary evidence that the same people under the Pharaohs could get their fill of honey at the very reasonable rate of five cents per quart.

In spite of the venerable antiquity of bee lore, however, scientists continue to discover new secrets of the mysterious community of the hive that their predecessors barely suspected. One of the most vexing problems of the beekeeper on which recent research has shed much helpful light, is how to get the colonies through the winter without sustaining heavy losses from the cold.

Now, despite the advent of the ice cream cone, the all day sucker, eskimo pies and the more ambitious confections retailing at \$2.00 a pound, honey still retains its place among the gustatory foibles of the children of men and no synthetic art of the chemist has ever been able to duplicate its delectable flavors. Some \$80,000,000, roughly estimated, is re-



HEADS UP, bodies parallel, the bees on the outside of the winter cluster, form an insulating shell around the squirming insects inside

alized every year from the sale of the products of the bee in this country alone. Of this amount fully ten per cent. has been lost annually from the bees' inability to withstand the cold weather.

Such a valuable industry has naturally been a subject of numerous investigations on the part of Uncle Sam's trained research workers. The Bee Culture Laboratory of the U. S. Bureau of Entomology, located just over the District of Columbia line at Somerset, Md., is one of the most complete outfits devoted exclusively to the study of bees in existence. And it is here that much of the scientific prying into the hibernal customs of the bees has taken place.

Honey bees, unlike their more primitive wild relatives, do not go into a true state of hibernation.

J. I. Hambleton, chief of the Bee Culture Laboratory at Somerset, describes their winter activities as follows: "When the weather is cold enough for frosts the bees gather together inside the hive in a large, more or less spherical cluster. The bees on the outside of the cluster are packed close beside each other with bodies parallel and heads up, to-

gether constituting an insulating shell inside of which there is no definite arrangement. These interior bees keep perpetually moving in a restless series of twisting, turning, wiggling gymnastics that are really heat producing exercises. The heat so manufactured is never permitted to run down below 57 degrees Fahrenheit in the exterior insulating shell. This activity is kept up all winter. In cold countries—and bees are kept as far north as Alaska—the hives have to be protected by heavy packing of insulating materials such as sawdust or straw in order to keep the bees from working themselves to death before spring comes."

In order to understand why bees are likely to wear themselves out keeping each other warm, it is necessary to explain a little bit about the physiology of the bee from the time it is first hatched as a larva. All bee babies are fed at first on a remarkable infant food secreted from the forehead of the worker bee. This concentrated substance is known as royal jelly and contains perfectly balanced proportions of the essential food elements, protein, carbohydrate and fat. This (Turn to next page)

How Bees Keep Warm—Continued

food is so rich that scientists at the bee laboratory have found by actual weighing experiments that a worker larva fed on it for six days will increase her weight 1,500 times, an astonishing rate of growth hardly surpassed by any other species. The royal larva that is selected to be a queen increases in weight 2,500 times in five and a half days.

However, in the usual order of things, drones and workers are not fed on this regal diet more than three days. Honey and pollen are their fare thereafter until they are grown up. But the queen subsists on it throughout the larval period, which is shorter for her than for either of the other two social castes. It should be borne in mind that the circumstances that make one of the countless larvae into a queen do not depend on food alone. The size and shape of the cell of the queen larva are also factors. Not even the gravest emergency of the hive can transform a worker larva into a queen by appropriate housing and food, if the larva is more than three days old. After that it is too late.

"When the adult bee," resumed

Mr. Hambleton, "emerges after living on this highly concentrated diet, she is possessed of her maximum strength. She lives on honey, one of the most efficient energy-producing foods known, but she cannot rest or replace wornout tissue like the higher animals or human beings. She is like a tiny, highly perfected living machine destined for a duration of life, under active summer conditions, of about six weeks. Consequently if she uses up her allotted fund of energy too fast doing her bit keeping the colony warm during the winter, she will die before spring. For these reasons it is very important that there should be plenty of young strong workers in the hive thoroughly capable of standing the strain of keeping up their endless heat producing gymnastics throughout the dark months of winter.

"In order that the colony should be supplied with plenty of young unworked bees in late fall, the wise beekeeper sees that the queen has plenty of space in which to lay eggs at the end of summer and early fall by preventing the workers from filling up all the cells with honey. Old

queens do not lay as many eggs as the summer working season draws to a close, so many beekeepers replace the queen in their colonies every year. The average queen lives two or three years, though she may last as long as seven. A young and vigorous queen, however, is the best guaranty of plenty of young unworked bees to keep up the hive temperature through the winter months, for most of the old bees die before spring."

The right sort of food is also a very important consideration. Peculiar seasonal variations take place in some of the digestive functions of honey bees during the winter that makes a diet of readily digestible honey of imperative importance for the health of the hive. In general the best honey for winter stores, Mr. Hambleton pointed out, is that gathered during the peak of the honey season of mid-summer. White clover and alfalfa are among the best varieties for this purpose while basswood is not so good.

If the hive becomes afflicted with digestive disturbances from the wrong sort of food, the bees lose their ability to maintain the correct temperature. Their restless activity increases to the point of frenzy with the result that the temperature becomes too high. If it should go up as high as 93 degrees, the queen, deluded into thinking summer has come, starts laying eggs and the colony is doomed. No brood can be raised in the winter time when there are no flowers to furnish pollen and honey for them to eat, but the worker bees wear themselves out in the vain attempt, feeding them from their own accumulation of winter stores.

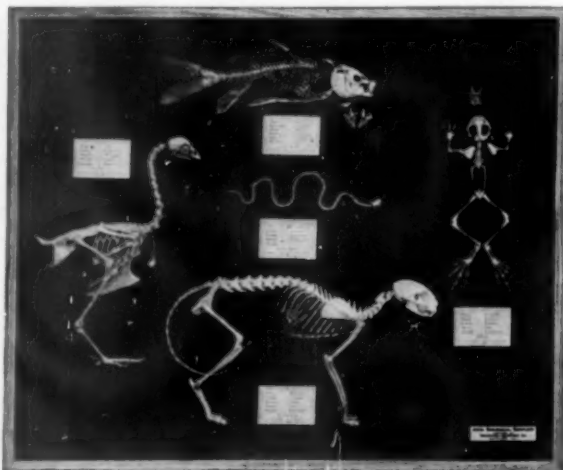
The scientific work on which the knowledge of interior temperatures of the winter cluster of bees is based, was done under the direction of Dr. E. E. Phillips, formerly in charge of bee culture investigations.

Many attempts were made throughout the history of bee culture to establish the temperatures inside the hive in winter, but most of them failed because mercury thermometers could not be inserted into the cluster without disturbing the bees so that the temperature would react abnormally. Dr. Phillips, assisted by George S. Demuth, was able to solve the problem by the use of specially constructed electrical thermometers fastened permanently in place in the hives undergoing tests, which could be read in the (Turn to next page)

High Grade Prepared Skeletons

At Favorable Prices

Satisfaction Guaranteed



Of the extensive line that we prepare and carry in stock, the following select items are favorites with High School and College instructors:

Z013	Squalus, cartilaginous, in museum jar	\$25.00
Z050	Necturus on base	11.00
Z061	Bull Frog in glass	12.00
Z066	Grass Frog in glass	6.50
Z0105	Turtle, 8" to 10"	12.50
Z0116	Alligator on base	25.00
Z0130	Chicken on base	16.00
Z0135	Cat on base	18.00
Z0195	Monkey on base	25.00

We have frequent calls from High Schools for a set of vertebrate skeletons mounted in a hardwood glass-covered wall case, size 24x32". This set includes the Perch, Pigeon, Turtle, Rat and Grass Frog, price \$53.00.

The larger set with specimens as illustrated above costs \$75.00.

Our skeletons are excellent for class use as well as for building up the permanent school museum.

Write for complete list and for biology catalog No. 5B

DENOYER-GEPPERT COMPANY

Makers and Importers of Anatomical Models, Charts, Skeletons, Specimens and Slides

5235-57 Ravenswood Avenue

Chicago, Ill.

Bees—Continued

laboratory without going near the bees themselves. These thermometers gave records accurate within 0.09 degrees Fahrenheit and within 0.05 Centigrade.

To insure uniformity the readings were made consecutively on a carefully calibrated instrument at the rate of two a minute, an impossible feat with widely scattered mercury thermometers. After the investigators had studied the temperature of various fixed points within each hive, they found it was possible to use the temperature readings as a substitute for direct observations, and to follow closely the activities of each bee cluster without opening the hives or even going near them.

Through this piece of research it was found that 57 degrees Fahrenheit was the critical temperature of the outside layer of the bee cluster in winter. If the bees are kept where the temperature goes above this point they break the cluster and leave the hive. If for any reason they fail to keep it up to this point for any length of time they die of the cold. Consequently it has been found advisable, explained Mr. Hambleton, to keep colonies in dark cellars where a constant temperature of around 45 to 47 degrees can be maintained. This has proved to be the golden mean, neither too low nor too high, at which the bees seem to survive best.

When bees are kept out of doors all winter it is necessary to pack up the hive with insulating materials like straw, ground cork, or sawdust. Many bees are saved if this is done before the first killing frost of autumn. Beekeepers are urged by the bee specialists to find out from maps of the U. S. Weather Bureau the average date of the first hard frosts in their community and fix up their bees accordingly. Sometimes it helps if the honey made from the fall flowers is taken out and more digestible sugar syrup substituted, so that a supply of the right sort of food is assured. A single colony consumes as much as 45 or 50 pounds of honey in a winter. The packing is not removed until the frosts of spring are over and the early flowers are in blossom, in May or June usually, except in regions well to the south.

There are in all about 10,000 described species of bees occurring in all parts of the world, of which about 2,000 species are found in Europe alone. When the North American forms have been more thoroughly studied, they will (Turn to next page)

Alaska's Golden Age Unearthed

Archæology

Alaska, like Greece, had its golden age, when the people attained the high point of their culture and then dropped to a less admirable level. Evidence of this prehistoric golden age in the Arctic has been brought back to the Smithsonian Institution by Henry B. Collins, Jr., who conducted an expedition to St. Lawrence Island this summer for the Smithsonian and for the American Association for the Advancement of Science.

On the narrow strip of land called St. Lawrence Island, Mr. Collins found a remarkable mound about 20 feet high and large enough to be the site of a compact village. The mound was composed of trash, the refuse and sweepings from an entire village over a period of many centuries. Animal bones and broken tools, bits of ivory and whalebone, pieces of wood carved in fantastic designs, all were mixed in with a binding of earth and permanently hard and frozen from the cold climate.

The most surprising moment in the digging came when the frozen bodies

of some of the oldest inhabitants were discovered encased in ice. Six children had been buried there in the side of the mound, each one dressed carefully in his fur and feather garments. The place where they lay happened to become filled with water, which froze, thus preserving the bodies through many centuries. This is the only time that human bodies have been found in such condition, Mr. Collins states.

Ruins of houses made of driftwood and whalebone were in the top layer of the great mound, Mr. Collins said, in describing his excavation of the site. Digging to the bottom of the mound, he found the ruins of the homes of the oldest inhabitants. To reach the most deeply buried deposit, where the oldest layer of ruins lay, Mr. Collins had to dig six feet below the reach of the storm tides. In other words, he explains, the land has sunk since those houses were built on the beach, and this in itself indicates the passage of considerable time.

This oldest layer of houses dates back to pre-Russian days, the ethnologist declares. They are surely 300 years old, and more likely are nearer to being eight centuries old. The village is the most extensive Eskimo settlement ever excavated.

Many harpoons and other tools and weapons were brought back to the Smithsonian collection. Objects displaying the finest art in carving and design were taken from the lowest and oldest level of the mound. These were made in the days of the highest Eskimo culture. The precision of the lines and the fine designs used indicate that these inhabitants were far more clever with their hands and had a keener sense of beauty than any of their descendants in the Arctic. Whether they were some of the "first Americans", some pioneer Asiatics who brought knowledge and skill to the new world, cannot yet be stated, Mr. Collins says. But it is certain that the Eskimos of historic times have lost a heritage of finer things, as the simpler carvings in the top layers of the mound show.

Present-day Eskimos, possibly direct descendants of the artists, came to the island and helped the scientist excavate. In some cases they were able to enlighten him as to the use of the peculiar articles discovered in the deserted village.

New Metal Cuts Glass

Physics—Mechanics

A new metal so hard that it will bore smooth holes in concrete, or cut screw threads in a glass rod, was exhibited for the first time at the convention of the American Society for Steel Treating in Philadelphia. With present-day tools such feats are difficult or even impossible.

The new material, known as carboboy, and consisting of tungsten carbide, a compound of tungsten and carbon, and cobalt, a metal like nickel, is the invention of Dr. Samuel L. Hoyt, of the research laboratory of the General Electric Co. It is so hard that it will cut glass like a diamond, and will even scratch a sapphire, which is next below the diamond in the scale of hardness. Ordinary steel tools are quickly worn down when held against an emery wheel, but the new metal itself wears down the wheel.

One important use for it described by Dr. Hoyt is in the cutting of materials containing metal inserts, as the fiber and metal gears used in automobiles to give quietness. Cutters of cobalt and chromium alloy, the best previously used for this work, require sharpening after machining 150 parts, but carboboy tools have cut 11,000 before they required re-dressing. *Science News-Letter, October 27, 1928*

Science News-Letter, October 27, 1928

Doctors in Old Egypt

Medicine

ALEXANDRE MORET in *The Nile and Egyptian Civilization* (Knopf):

Medicine, then, was intimately bound up with religious beliefs and magical arts. . . .

Remedies are often accompanied by incantations, allusions to some deity—Isis, Thoth, Horus, Ra, Anubis, Imhetep, Amon-Ra—who was cured by the same prescription, and will come to the aid of the physician. To speak these spells "in the right voice" made a cure fairly certain.

Luckily for the reputation of the Egyptian physician, a papyrus has recently been analysed which reveals a more scientific spirit. The Edwin Smith Papyrus discusses surgical cases, classifying them in order, from the head downwards, in a methodical manner very different from the fanciful exposition of the medical papyri. In the portion preserved there are ten observations for the head, four for the nose, three for the jaws, five for the temporal region, five for the ear, lips, and chin, six for the throat and cervical vertebrae, five for the clavicular and scapular region, nine for the thorax and breasts, and one for the backbone; the rest is missing. Each case is set forth methodically. The complete exposition of a case comprises: 1, Statement—Remedies for a given case; 2, Observation—If you examine a case presenting so-and-so; 3, Diagnosis—Say of it, "It is such-and-such a malady"; 4, Prognosis—If it is mild, say, "It is a malady which I can treat"; if it is doubtful, "It is a malady which I can combat"; if it is incurable, "It is a malady for which I can do nothing"; 5, Treatment—For a wound in the temple, "Apply fresh meat the first day; then treat with an ointment and honey until healed."

In only one case, out of forty-eight, is a magical charm added to the treatment. . . .

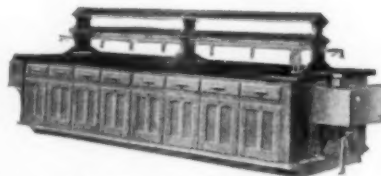
We need not be surprised that Herodotus proclaims the triumph of medicine in the country. In Egypt, he says, medicine is specialized, like oracles. "Each physician deals with one malady, not more. And the whole place is full of physicians. Some are established as healers of the eyes, others of the head, others of the teeth, others of the region of the belly, and others of internal complaints." Now, this specialization, which, after all, proves a scientific method, was very ancient; in the Old Kingdom, Pharaoh had physicians "for his two eyes."

Science News-Letter, October 27, 1928

For the Teaching of Chemistry

For the teaching of Chemistry, as well as for instruction in other sciences, it is generally admitted that there is no equipment that enjoys the prestige and reputation among educators to the extent of

Kewaunee Laboratory Furniture



Chemical Desk No. 862

This desk, with exposed plumbing and trough, is a favorite and has been installed in many laboratories. The gas and water pipes, with convenient outlets, are placed under the lower shelf and directly over the trough. The trough is lead-lined and slopes from the middle toward the two end sinks. Accommodates sixteen students, working in sections of eight.

Every Science Teacher Knows

the importance of properly-designed, properly-built laboratory furniture, and how much influence it exerts upon the character of work of the students.

Kewaunee Laboratory Furniture has been endorsed by educational authorities in every state in the United States. Its superior design, better construction and finer finish have made Kewaunee Equipment the choice for thousands of laboratories in our best schools.

Send us your floor plan blueprints or rough sketches. We will make suggestive layout for equipment to meet your requirements without charge or obligation.

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS

C. G. Campbell, Pres. and Gen. Mgr.
206 Lincoln St., Kewaunee, Wis.

Chicago Office
25 E. Jackson Blvd.
Room 1511

New York Office
70 Fifth Avenue

Offices in Principal Cities

Bees—Concluded

probably prove to be more numerous. Only 500 species, or five per cent., are social, that is, live in organized communities. The remainder are solitary forms of many families some of which are very large and widely distributed. In this huge group the honey bee stands in much the same relation to the other members of the family as man does to the other animals, a fact that has to a certain extent obscured a real knowledge and understanding of the honey bee itself. Much fable, superstition and sentiment have clouded over the accurate observations necessary for the clear understanding of this valuable and highly interesting insect.

Entomologically speaking, the bees are considered merely as a group of wasps which have forsaken a carnivorous diet of caterpillars, grubs, spiders, etc., and turned vegetarian, subsisting entirely on pollen and honey. One specialist in this group of insects has designated them as "flower wasps" while many German entomologists refer to them as "Blumenwespen."

The long and intimate association with flowers has left its stamp on all the organs and habits of the bees, while botanists believe that a great many flowers have been modified in structure, arrangement and color in adaptation to the bees for the purpose of cross pollination.

The solitary bees and those social bees with less complex systems of living than the honey bee have a much more ruthless, less intricate way of insuring the survival of their species over the cold months. Among the social wasps and the bumble bees the whole colony dies at the onset of cold weather with the exception of a few hardy young queens that have appeared in the brood late in the fall. These hide themselves away in cracks or other protected places and after emerging in the spring, lay eggs and tend the young larvae until they are old enough to collect honey and otherwise survive her majesty, who now concentrates exclusively on the serious business of egg laying. From such a simple form of communism have the honey bees evolved by some mysterious process their highly organized and perfected method of survival.

Science News-Letter, October 27, 1928

None of the many schemes to dispel fog artificially has proved commercially practical.

European Bison Herd Extinct

Zoology

The wisent, Europe's representative of the bison family and close cousin to the American bison, appears to be certainly doomed to extinction. The herd of the Caucasus region, which numbered 1,000 head in 1911, has now totally vanished. So states Prof. J. Pujanow of Semferopol, who has just completed a survey of the status of this vanishing species.

In 1924 the Soviet government set aside an area of 1,100 square miles in the Caucasus as a permanent wisent reserve. At that time there were known to be 25 head of the animals still in existence in the region, and it was hoped that under protection they might stage a come-back like that of the American bison in the national parks of the United States and Canada. Parties of naturalists in the field in 1924 and 1925 failed to catch a glimpse of any of the animals, which remained hidden in the more remote fastnesses of the rugged terrain. Last year a larger group of zoologists who had had special experience with the wisent took the field and explored the region thoroughly, combing every valley.

They did not find a single living animal. They came upon plenty of bones, some of them bearing bullet marks, indicative of the inability of the inadequate government patrol to

stop illegal shooting. The bones all seemed to be from animals not long dead—two or three years at most; so that it seems probable that the herd was there when the reserve was created for it, but has been wiped out since. There may still possibly be one or two wisent in remote haunts in the Caucasus, but they can no longer be counted on to help stay the march of the species toward extinction.

The wisent was formerly an important game animal in Europe, and until the seventeenth century was actively hunted. The advance of civilization in eastern Europe, however, drove it toward extinction as the advance of civilization later in western America threatened the New World bison. A large herd in the Baltic region was almost wiped out during the war; only five specimens now survive. There was also a wisent preserve in the Crimea before the war, but this was destroyed during the Russian revolution. There are still a few specimens scattered about in zoological parks in England and northern Continental Europe, and an association has been formed which is endeavoring to prolong the life of the species. But the news of the wiping out of the Caucasus herd comes as a heavy blow to friends of the wisent.

Science News-Letter, October 27, 1928

Studies How Child Sleeps

Psychology

The hush-a-bye-baby song method of getting a youngster to sleep is passing. This is the state of affairs in Canada at least, as shown by an investigation of children's sleep habits, made at the University of Toronto by Dr. W. E. Blatz and Nellie Chant.

A scientific report of the investigation in the *Genetic Psychology Monographs* shows that out of 96 children under ten years of age, only 22 were familiar with the sweet but unsatisfactory practice of going to sleep to the sound of a lullaby. Out of the 56 youngsters under five years old, there were just six that enjoyed the demoralizing luxury of being rocked to sleep.

Considerable irregularity in bedtime hours was noted by the psychologists. Varying the bedtime schedule by ten or twenty minutes may seem unimportant, but it is one factor that can prevent a child from developing regular habits of sleeping.

Sleeping in the daytime has no effect on the night sleep of infants, but too much daytime sleep interferes with the night rest of older children, it was found. Between the third and fourth year of life, the child should not be permitted to sleep longer than about one and a half hours in the daytime, the psychologists conclude. More than this not only interferes with night rest but also deprives the child of fresh air and play activity that he needs.

Many parents do not understand that in children over three years old the habit of daytime sleep is beginning to break up and that this break is on the all-or-none principle, the psychologists point out. When these older children do sleep, the length of their nap is not much shorter than with young children. Insisting on an older child taking a short nap every day apparently is less wise than having him rest on occasional days.

Science News-Letter, October 27, 1928

Fossil Indian Bones

Archæology

Near the Scripps Institution of Oceanography at La Jolla, Calif., have recently been found, during steam-shovel operations, human remains which are heavy and hard as if completely fossilized. They are fully as solid as any "petrified" bone of an earlier mammal or reptile from the deposits of bygone ages. The bones seem harder and heavier than the "Los Angeles Man" now preserved in the Los Angeles Museum at Exposition Park.

The fossilized human bones were found deeply embedded in a low stratum of secondary fill, from which the limy fossilizing mineral, calcite, was derived. Above this layer were found other human bones, skulls, jaws and limb bones. No careful observations of the relationships of the skeletons to the clay and to each other were possible at the time the steam-shovel was ripping things to pieces, and only by great good fortune were the bones saved.

The upper and lower teeth of the "fossilized man" show distinct evidence of pyorrhea, abscesses and a most curious form of wearing down of the crowns.

It is uncertain to what group of Indians the relics belong, since practically all of the Indian tribes of southern California practiced cremation, and there are no skeletal remains with which to compare the newly discovered skeletons. Studies are now actively under way and reports are hoped for soon.

Science News-Letter, October 27, 1928

Down-Stairs Skyscraper

Architecture

The child's conception of things in the Orient being topsy-turvy is upheld by a Japanese project for a down-stairs skyscraper, 80 stories deep. This building, which would be built down into the earth 1,100 feet, is designed in defiance of earthquakes.

This world's deepest skyscraper is planned for Tokyo, where earthquake proof architecture has been a serious problem ever since the disastrous quake of 1923. Designs for the building are in the form of a huge circular well of steel framework. Elevators, ventilating airshafts, telephones, and electric lights are provided for. The cost is set at about \$11,000,000. The Shin Nippon Construction Company is interested in the project.

Science News-Letter, October 27, 1928

'Nature': A Literary Find

Philosophy

John Middleton Murry, editor of the *Adelphi*, unearthed this remarkable double document from the files of the scientific periodical, *Nature*. He discovered that Huxley had translated Goethe's rhapsody and published it, as a *feu d'esprit*, over his own name in the issue of November 4, 1869. This quotation is from *The Living Age*, which, in turn, reprinted it from the *Adelphi*.

'Nature! We are surrounded and embraced by her; powerless to separate ourselves from her, and powerless to penetrate beyond her.

'Without asking, or warning, she snatches us up into her circling dance, and whirls us on until we are tired, and drop from her arms.

'She is ever shaping new forms; what is, has never yet been; what has been, comes not again. Everything is new, and yet naught but the old.

'We live in her midst and know her not. She is incessantly speaking to us, but betrays not her secret. We constantly act upon her, and yet have no power over her.

'The one thing she seems to aim at is Individuality; yet she cares nothing for individuals. She is always building up and destroying; but her workshop is inaccessible.

'Her life is in her children; but where is the mother? She is the only artist; working up the most uniform material into utter opposites; arriving, without a trace of effort, at perfection, at the most exact precision, though always veiled under a certain softness.

'Each of her works has an essence of its own; each of her phenomena a special characterization; and yet their diversity is in unity.

'She performs a play; we know not whether she sees it herself, and yet she acts for us, the lookers-on.

'Incessant life, development, and movement are in her, but she advances not. She changes forever and ever, and rests not a moment. Quietude is inconceivable to her, and she has laid her curse upon rest. She is firm. Her steps are measured, her exceptions rare, her laws unchangeable.

'She has always thought, and always thinks; though not as a man, but as Nature. She broods over an all-comprehending idea, which no searching can find out.

'Mankind dwell in her and she in them. With all men she plays a game for love, and rejoices the more they win. With many her moves are so hidden that the game is over before they know it.

'That which is most unnatural is

still Nature; the stupidest Philistinism has a touch of her genius. Whoso cannot see her everywhere, sees her nowhere rightly.

'She loves herself, and her innumerable eyes and affections are fixed upon herself. She has divided herself that she may be her own delight. She causes an endless succession of new capacities for enjoyment to spring up, that her insatiable sympathy may be assuaged.

'She rejoices in illusion. Whoso destroys it in himself and others, him she punishes with the sternest tyranny. Whoso follows her in faith, him she takes as a child to her bosom.

'Her children are numberless. To none is she altogether miserly; but she has her favorites, on whom she squanders much, and for whom she makes great sacrifices. Over greatness she spreads her shield.

'She tosses her creatures out of nothingness, and tells them not whence they came, nor whither they go. It is their business to run, she knows the road.

'Her mechanism has few springs—but they never wear out, are always active and manifold.

'The spectacle of Nature is always new, for she is always renewing the spectators. Life is her most exquisite invention; and death her expert contrivance to get plenty of life.

'She wraps man in darkness, and makes him forever long for light. She creates him dependent upon the earth, dull and heavy; and yet is always shaking him until he attempts to soar above it.

'She creates needs because she loves action. Wondrous that she produces all this action so easily! Every need is a benefit, swiftly satisfied, swiftly renewed. Every fresh want is a new source of pleasure, but she soon reaches an equilibrium. . . .

'We obey her laws even when we rebel against them; we work with her even when we desire to work against her.

'She makes every gift a benefit by causing us to want it. She delays, that we may desire her; she hastens, that we may not weary of her.

'She has neither language nor discourse; but she creates tongues and hearts, by which she feels and speaks.

'Her crown is love. Through love alone dare we come near her. She separates all existences, and all tend

to intermingle. She has isolated all things in order that all may approach one another. She holds a couple of draughts from the cup of love to be fair payment for the pains of a lifetime.

'She is all things. She rewards herself and punishes herself; is her own joy and her own misery. She is rough and tender, lovely and hateful, powerless and omnipotent. She is an eternal present. Past and future are known to her. The present is her eternity. She is beneficent. I praise her and all her works. She is silent and wise.

'No explanation is wrung from her; no present won from her, which she does not give freely. She is cunning, but for good ends, and it is best not to notice her tricks.

'She is complete, but never finished. As she works now, so can she always work. Everyone sees her in his own fashion. She hides under a thousand names and phrases, and is always the same. She has brought me here and will also lead me away. I trust her. She may scold me, but she will not hate her work. It was not I who spoke of her. No! What is false and what is true, she has spoken it all. The fault, the merit, is all hers.'

So far Goethe.

When my friend, the editor of *Nature*, asked me to write an opening article for his first number, there came into my mind this wonderful rhapsody on 'Nature,' which has been a delight to me from youth up. It seemed to me that no more fitting preface could be put before a Journal, which aims to mirror the progress of that fashioning by Nature of a picture of herself, in the mind of man, which we call the progress of Science.

A translation, to be worth anything, should reproduce the words, the sense, and the form of the original. But when that original is Goethe's it is hard indeed to obtain this ideal; harder still, perhaps, to know whether one has reached it, or only added another to the long list of those who have tried to put the great German poet into English, and failed.

Supposing, however, that critical judges are satisfied with the translation as such, there lies beyond them the chance of another reckoning with the British public, (Turn to page 264)

NATURE RAMBLINGS

By FRANK THONE

Natural History



Liquidambar

Anybody who is planning on putting a group of shade or ornamental trees, whether in a park planting, around a country house or even on a fair-sized city place, will do well to remember the liquidambar, or sweet-gum. This splendid tree of the American southeast is at least moderately hardy, and will thrive in cultivation many hundreds of miles north and west of its natural range.

It may have to be nursed a bit while it is little, and there will always remain the danger that a too-stiff windstorm will wrench off a limb, for its wood is none too strong; but even so, it will, in many future autumns, repay a thousand times over the care it gets.

For there is scarcely a tree that can show such splendid leaves in the fall. Pointed like stars, they change from their strong summer green to a deep wine-purple that is the very blood of the sun. An autumn-colored liquidambar against a sunset sky, with the light shining through its sanguine leaves, is a sight not soon to be forgotten.

The fruits of the liquidambar tree also are worth growing to look at, though they are not good for even birds or squirrels to eat. They are such curious-looking things, bristling toward all the stars with their hundred sharp little points, like maces for the wars of fairy cavalry.

And the twigs of the tree intrigue one's interest as well, for they have caught the trick, known to a few widely scattered woody plants, of developing their cork in long, narrow streaks, so that they come to be ridged with "wings" of bark. All round, the sweet-gum is a tree of great interest as well as great beauty.

Science News-Letter, October 27, 1928

About 28 cents of the consumer's dollar spent in retail stores goes for food.

Photographs Show Altitude Records

Photography—Aviation

A new method of determining the altitude of airplanes above the ground is forecast here as the result of photographs made on a recent record-breaking flight of the Army Air Corps. The flight was made by Capt. St. Clair Streett, accompanied by Capt. Albert W. Stevens as observer and photographer. Though the Bureau of Standards has not yet checked up on their altitude, they are believed to have reached 40,200 feet, at which height they made photographs of the city of Dayton, Ohio. This altitude is higher than the present record for a plane with one man, two men, or photography.

Despite a scattering of clouds at 6,000 feet, the photographs show the highways and outstanding structural characteristics of the territory below with remarkable clarity. So distinct are the pictures, in fact, that they could stand enlargement to ten diam-

eters. The high altitude photographs taken by Captain Stevens offer a new method of obtaining altitude measurements. If three or more points on the ground are shown, the distances between which are known from accurate ground survey data, by measuring the distance of the image separations on the negative and knowing the distance from the negative to the optical center of the lens in the camera, then the problem of the length of the perpendicular dropped from the lens to the ground becomes a geometric one of similar triangles, and can be figured in feet or meters to within one-tenth of one per cent. mathematical accuracy. Comparison of the results thus obtained with those gained from the barograph formula method employed by the statisticians, will undoubtedly prove both interesting and important.

Science News-Letter, October 27, 1928

Rays from Cells Doubted

Biology

The emanation of rays from living cells, which speed up the division of other cells, as claimed by the Russian scientist Dr. Gurwitsch, has been denied by two German plant physiologists at the University of Rostock, Prof. H. von Guttenberg and Dr. Rossmann. They state that a careful repetition of the work of the Russian experimenter, performed exactly according to the methods he describes and checked by observation of control experiments, has failed to produce the results described at first. Not only did living cells fail to show any changes which might be attributed to other cells supposed to be sending their rays into them, but a more delicate test, wherein the supposedly radiant cells were placed in contact with photographic plates, also gave negative results, according to the two German researchers.

Science News-Letter, October 27, 1928

New Things in Tobacco

Chemistry

Two new tobacco alkaloids have been isolated by Dr. N. Ehrenstein of the University of Munich. One of these new compounds is known as "nornicotine," and is an isomer, or chemical double, of the old familiar nicotine. The other bears the tongue-tripping title of "pyridyl piperidine."

Science News-Letter, October 27, 1928

In a list of 13,500 American scientists, more than one-fifth are chemists.

Nineveh and Ur

Archæology

Ruins of Nineveh, Ur, Kish, and other famous centers of Tigris-Euphrates civilization will soon be busy scenes of archæological activity. October weather starts off the archæological season in Iraq, and this year as many as nine expeditions will be digging and exploring in this region east of Palestine.

Ur of the Chaldees, which last year gave up royal burials of startling pomp and ceremony, will again be visited by the joint expedition of the British Museum and the Museum of the University of Pennsylvania. This is the expedition's seventh season at Ur. Oxford University and the Field Museum will also start their seventh year's joint work, at Kish.

Nineveh will be further explored, according to plans by Dr. R. Campbell Thompson. German archæologists will work at sites bordering the Tigris and at the site of Erech, mentioned in Genesis. French scientists will resume pre-war excavations at Tel-O. An expedition from the University of Michigan will seek the lost town of Opis, near Ctesiphon.

A search for oldest inhabitants of the region will be made by Miss Daisy Garrod, leading a Joint Expedition of the Percy Sladen Memorial Fund and the American School of Prehistoric Research. This group will explore cave deposits along the Iraq-Persian border, seeking fossil bones of prehistoric men.

Science News-Letter, October 27, 1928

Turtox News

is a monthly bulletin of Biology
mailed free to over

Twenty thousand Biologists

Turtox News contains material of interest to every Biology teacher. Recent numbers have included the following articles:

Laboratory Work in High School Biology.
Models as Teaching Aids.
Bird Banding.
Adventures in Biology.
Across the Gulf Stream.
Notes on the Egg-laying Habits of the Turtle.
Bacteria that Cause Plant Diseases.
Life History of Conocephalus.
Animals of the Mississippi Flood Region.
The Balanced Aquarium.
Carnivorous Plants.
Living Plants and Animals in the School Laboratory.
A Naturalist in Florida.
The Standard Biology Course.

If you are not receiving Turtox News ask us to place your name upon the mailing list. It will be mailed to you each month without charge if you will furnish us with your teaching address.



The Sign of the Turtox Pledges Absolute Satisfaction

General Biological Supply House

(INCORPORATED)

761-763 East Sixty-ninth Place

Chicago

Illinois

Nature—Continued

who dislike what they call 'Pantheism' almost as much as I do, and who will certainly find this essay of the poet's terribly Pantheistic. In fact, Goethe himself almost admits that it is so. In a curious explanatory letter, addressed to Chancellor von Müller, under date May 26, 1828, he writes:—

This essay was sent to me a short time ago from amongst the papers of the ever-honored Duchess Anna Amelia; it is written by a well-known hand, of which I was accustomed to avail myself in my affairs, in the year 1780, or thereabouts.

I do not exactly remember having written these reflections, but they very well agree with the ideas which had at that time become developed in my mind. I might term the degree of insight which I had then attained, a comparative one, which was trying to express its tendency towards a not yet attained superlative.

There is an obvious inclination to a sort of Pantheism, to the conception of an unfathomable, unconditional, humorously self-contradictory Being, underlying the phenomena of Nature; and it may pass as a jest, with a bitter truth in it.

Goethe says that about the date of this composition of 'Nature' he was chiefly occupied with comparative anatomy; and, in 1786, he gave himself incredible trouble to get other people to take an interest in his discovery that man has an intermaxillary bone. After that he went on to the metamorphosis of plants, and to the theory of the skull, and at length had the pleasure of seeing his work taken up by the German naturalists. The letter ends thus:—

If we consider the high achievements by which all the phenomena of Nature have been linked together in the human mind; and then, once more, thoughtfully peruse the above essay, from which we started, we shall not without a smile, compare that comparative, as I called it, with the superlative we have now reached, and rejoice in the progress of fifty years.

Forty years have passed since these words were written, and we look again, 'not without a smile,' on Goethe's superlative. But the road which led from his comparative to his superlative has been diligently followed, until the notions which represented Goethe's superlative are now the common places of science—and we have a super-superlative of our own.

When another half-century has passed, curious readers of the back numbers of *Nature* will probably look on our best, 'not without a smile'; and it may be that long after the theories of the philosophers whose achievements are recorded in these pages are obsolete the vision of the poet will remain as a truthful and efficient symbol of the wonder and mystery of Nature.

Science News-Letter, October 27, 1928

FIRST GLANCES AT NEW BOOKS

THE TWILIGHT OF THE AMERICAN MIND—Walter B. Pitkin—*Simon and Schuster* (\$3). Exactly how the million-odd brightest minds in America constitute an economic and sociological problem is set forth with a startling array of statistics and illustrations in this warning volume. "Only one adult Best Mind in every 350 Americans can today find suitable employment," Dr. Pitkin finally declares. "But there is one such Best Mind in every 100 Americans, by definition." And as the tendency to breed superiority into the race increases, the situation approaches a critical stage. The book ends with a question as to what the future may hold, but before reaching that pessimistic question mark, the author has set forth suggestions on two points, namely, what goal eugenics should aim at, and the ways in which mental stability of the nation's Best Minds may be preserved.

Sociology—Psychology

Science News-Letter, October 27, 1928

THE NILE AND EGYPTIAN CIVILIZATION—Alexandre Moret—*Knopf* (\$7.50). Without making any strenuous efforts at popular appeal, the author of this history interprets Egypt with such an abundance of explanation and illustration that his account will attract casual readers as well as serve as a useful students' text and reference work. The French professor presents Egypt, not as a static nation, ponderous like its monuments, but as a developing, plastic nation. The remarkable shift from sacred despotism to state socialism is particularly emphasized and made understandable. The progress of religious thought, which played so vital a part in Egypt's destinies, is carefully traced.

History

Science News-Letter, October 27, 1928

ELEMENTARY GEOGRAPHY—Frank M. McMurry and A. E. Parkins—*Macmillan* (\$.84). In this revised edition the authors have aimed particularly to increase the simplicity of the text. The result is a practical and attractive school book, intended apparently for about the fifth grade. The things that a child is likely to be interested in have been kept steadily to the fore. The chapter in which life in the United States is compared with life in other countries is a valuable device.

Geography

Science News-Letter, October 27, 1928

CROSSROADS IN THE MIND OF MAN—Truman L. Kelley—*Stanford Univ. Press* (\$4). A scholarly attempt to determine independent mental traits present throughout life with a view to differentiating between them and understanding their laws of functioning. Dr. Kelley's emphasis is laid on the technique and mathematical procedures necessary in the co-ordinating study of individual traits.

Psychology

Science News-Letter, October 27, 1928

NEWMAN ON THE PSYCHOLOGY OF FAITH—Sylvester P. Juergens—*Macmillan* (\$2.75). A detailed analytical study of Cardinal Newman's argumentative writings on faith. The reasoning steps followed by the famous churchman in building up his theory as to the reasonableness of faith are clearly presented.

Theology—Psychology

Science News-Letter, October 27, 1928

PUBLICITY FOR SOCIAL WORK—Mary Swain Routzahn and Evart G. Routzahn—*Russell Sage Foundation* (\$3). A real "life-saver" for those individuals who good-naturedly—or protestingly—set out to handle publicity for some worthwhile cause. Every angle of publicity is discussed and explained, from getting into print and writing in news style to public speaking and parades. Experienced publicity writers will also find this a useful reference book and a source of many ideas.

Sociology

Science News-Letter, October 27, 1928

MODEL AIRPLANES—Elmer L. Allen—*Stokes* (\$3.50). Lindbergh's flight to Paris turned the hands of American youth toward the construction of model airplanes, and this is one of the books that answer the demands for directions and plans.

Aviation

Science News-Letter, October 27, 1928

THE AIRCRAFT HANDBOOK—Fred H. Colvin and Henry F. Colvin—*McGraw-Hill* (\$4). A new edition of the essence of aviation from a practical standpoint.

Aviation

Science News-Letter, October 27, 1928

A TEXTBOOK OF GENERAL BOTANY—Gilbert M. Smith and others—*Macmillan* (\$3.75). A revision of an excellent and successful text.

Botany

Science News-Letter, October 27, 1928

THE PSYCHOLOGY OF INDIVIDUAL DIFFERENCES—Robert S. Ellis—*Appleton* (\$3.50). An attractive angle from which to approach psychology. The author skilfully uses this approach to present outstanding facts on practically every allied topic, from the mechanism of heredity and variation to age and sex differences in mental traits. Simple, orderly explanations of such basic material as statistical methods, glands, Mendelian principles, and types of mental defectives insure the reader's understanding of the discussions which follow.

Psychology

Science News-Letter, October 27, 1928

PSYCHOLOGY FOR THE WRITER—H. K. Nixon—*Harper* (\$2.50). Psychology has much knowledge that might be presented to the literary aspirant in such a way as to be directly useful to him. This general survey of the ground gives the fiction writer an idea of the possibilities. It also leaves him with definite ideas of how he can deliberately put scientific principles to work in his creation of characters, in his use of language for effect, and in appeals to reader interest. The analyses of methods used by well-known authors and the demonstrations of how effect can be measured are particularly interesting.

Psychology

Science News-Letter, October 27, 1928

THE PROBLEM CHILD AT HOME—Mary Buell Sayles—*Commonwealth Fund* (\$1.50). A book dealing with relationships between children and parents, intended primarily for parents whose children display jealousies, tempers, or anti-social traits that bring them into conflict with other people. The author's aim is to "draw from the experiences of fathers and mothers and children who came to the clinics helpful suggestions for other parents faced by similar problems." Since the average family struggles with the same problems of childhood that are seen in exaggerated form in the problem child, these discussions of the relationships between parents and children should also be of interest to mothers and fathers whose children have never been officially rated as "problems."

Psychiatry

Science News-Letter, October 27, 1928

THE SECRET JUNGLE—R. J. McGregor—*Sheldon* (\$1). Hunting adventures in India, told for boys.

Fiction

Science News-Letter, October 27, 1928

Science, Enemy of Slavery

Sociology

JAMES J. DAVIS, Secretary of Labor, in *Monthly Labor Review*.

It seems you will find man the busy inventor at all ages. When Cæsar conquered the Germanic peoples he found them using a machine for harvesting their wheat. A pair of oxen pushed it through the grain. Less than a generation ago the same type of machine was used here in America and known as the header. A revolving wheel bent the heads of wheat over a row of fingers or slots that tore off the grain as the machine was pushed along. Thus a harvester better than the one known to our grandfathers had been developed by a people the Romans regarded as "barbarous."

I cite the above for a reason. When Cæsar conquered those inventive people slavery was introduced among them. The result was that the machine passed out of use. It was cheaper and easier to force the slaves to do the work. A good slave could be bought for \$5, and that harvesting machine disappeared for centuries. What better proof could we want for the fact that the real conqueror of human slavery is science with its machinery? If you want to see at a glance what happens when science is not applied to industry, you see it in Cæsar's blow to that promising invention.

The truth is that the ancient peoples knew more than we give them credit for about the mechanical laws we have forced to serve us in such stupendous fashion. More than a century before the birth of Christ a man named Hero had invented a primitive steam engine. And, again, a mechanical device that might have led to the more rapid advancement of man was blighted by a less fortunate human device. Once more the abundance and cheapness of human slaves entered in, and Hero's engine remained a curiosity in a museum.

In the history of chemistry you find the same sad story. The spade of the explorer has turned up Babylonian tablets bearing five different recipes for the making of glass. Not only the formula is given but the process of manufacture is described. The wonderful part of it is that the glass mixed in Babylonia 3,000 years before Christ is the same as the

glass of to-day, except the Babylonian glass was rough, whereas the laboratory has given us the vastly refined glass. But to-day marvelous machines turn out our glass, so that thousands of workers whose lives used to be shortened by the heavy work of blowing it are released to other pursuits. In Babylon, of course, nobody cared if a \$5 slave died early. His place was quickly taken by another \$5 purchase.

I can think of only one activity in which science has not placed us far, far ahead of the ancients. That is in road building. To-day we build roads overnight. We wear them out nearly as fast. But that is because in this modern day we subject them to loads and usage unknown in the long ago, unknown even 20 years ago. The roads built by the Romans when Christ was a boy are still in use. Those Romans were willing to employ hundreds of thousands of men for many years in building a few miles of roadway. It is little wonder that the highways they constructed have lasted for thousands of years. Whether even their great roads would have lasted, however, if subjected to wear and tear from the thundering thousands of trucks and busses that rush at high speed over our concrete ways, is doubtful. But the chief point about the Roman road is, once more, that it was built by slave labor, and the labor broke the slaves.

What an enduring road for human progress we have built instead! In Roman days slave labor was too cheap for time to be wasted on machinery. To-day human life is too valuable to waste when machinery is so cheap and efficient. That is the road we have traveled, with science to lead us. And what an immense distance we have come! . . .

Because of all these things our whole method of measuring things is being changed. Prosperity used to be measured by the number of things sold. I firmly believe that within 10 years we shall accept what is to my mind the only true measure of prosperity—that is, the general distribution of employment. We are trailing along the old lines of economic theory in the matter of production, when the object sought was the production of more and more,

and ever more. I believe that within 10 years this theory of the old-time economists will be obsolete. I believe the real object to be sought in the future is the manufacture of just enough to satisfy the national demand and the orders that come to us from other lands, and no more.

More and more our industries are paying for brains rather than muscle. Manual skill alone is no longer enough. Brains are more and more demanded, and we are training the brainier worker to supply the demand. It is to be questioned whether automobiles, radio, the motion picture, lectures, and night schools would have appealed to the workman of a hundred and fifty years ago. At the end of his long day's work he was too tired to feel any interest in such opportunities and forms of amusement. Science has come to his aid, with lighter work, shorter hours, higher pay, and more "time to think." But the job is not finished, and science will carry us still farther.

If a Greek of 2,000 years ago were to return to earth he would be amazed by these developments of modern practical science. He would marvel at the steam engine and the radio, the telegraph and the telephone, the automobile, the electric light, and the enormous wealth our machinery is turning out. But after he had made the round of shop and mine and field he might inquire whether we had brought our minds and bodies along in pace with our machines. For the people of Greece cared more for a sound mind in a sound body than they did for amassing great wealth. The one thing that might reconcile a returned Greek to much of our modern life would be his discovery that human slavery as he once knew it has come to an end and that the machine has become the slave.

This is the crowning glory of our modern world, and science has been the giver. Having now freed man from much or most of his ancient labors, the next great work for science is to make this new freeman with "time to think" happier not by what amazing things he owns but by what amazing things he can think and do.